Cureus
Part of SPRINGER NATURE

Open Access Case Report

Spinopelvic Dissociation Following a Tonic-Clonic Seizure in the Absence of Trauma: A Case Report

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Review began 10/22/2026
Review ended 11/11/2026
Published 11/13/2026

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DOI: 10.7759/cureus.119613

Abstract

Spinopelvic dissociation is a rare and severe injury typically associated with high-energy trauma and significant neurological compromise. Seizure-related fractures are well recognised; however, complex spinal injuries occurring in the absence of trauma are uncommon and may be overlooked.

We report a case of a 26-year-old male with a history of epilepsy who developed acute lower back and bilateral leg pain, following a witnessed tonic-clonic seizure while seated, without any associated fall or external trauma. Neurological examination demonstrated sacral sensory loss, absent anal tone, and absent catheter tug sensation, consistent with cauda equina syndrome. Imaging demonstrated a displaced U-shaped sacral fracture with spinopelvic dissociation, classified as AO (Arbeitsgemeinschaft für Osteosynthesefragen) type C3. The patient underwent L5 to S2AI instrumented fusion, with iliosacral screw fixation. Postoperatively, he demonstrated significant improvement in pain and partial neurological recovery and was independently mobilising before discharge; however, perianal sensation remained absent at discharge.

This case highlights that severe and unstable spinal injuries can occur secondary to seizure activity in the absence of trauma. Early recognition and appropriate imaging are essential in post-ictal patients presenting with back pain and neurological deficits.

Categories: Trauma, Neurology, Orthopedics
Keywords: cauda equina syndrome (ces), epileptic seizures, post-ictal, spinopelvic dissociation, tonic-clonic seizure

Introduction

Patients with epilepsy have an increased risk of musculoskeletal injury, with fracture rates higher than those observed in the general population [1]. Most of these injuries are caused by falls or external trauma during seizure episodes, although fractures may also occur due to intense muscle contractions [2,3]. Commonly reported seizure-related injuries include posterior shoulder dislocations, vertebral compression fractures, and femoral neck fractures [4].

Spinopelvic dissociation is a rare and severe injury pattern, typically associated with high-energy trauma and significant neurological compromise [5]. Severe spinal injuries have previously been reported in association with tonic-clonic seizures, although some cases have involved significant trauma [3]. Although serious spinal pathology accounts for only a small proportion of patients presenting with lower back pain, recognising these conditions is important because of their potential consequences [6]. Our patient sustained a U-shaped sacral fracture with spinopelvic dissociation without any reported fall or external trauma.

This rare case of spinopelvic dissociation occurring following a tonic-clonic seizure in the absence of trauma highlights an unusual mechanism of injury and the importance of recognising significant spinal pathology in post-ictal patients presenting with back pain and neurological deficits. This case report has been prepared in accordance with the CaReL guideline for case reports and literature review [7].

Case Presentation

A 26-year-old male with a known history of epilepsy presented to the emergency department following a witnessed tonic-clonic seizure while seated in the passenger seat of a car. The patient had been diagnosed with epilepsy approximately two years before this presentation, following two unprovoked seizures. No known risk factors for epilepsy were identified from his medical history. He was prescribed levetiracetam 500 mg twice daily, with no documented use of other anti-seizure medications. The seizure lasted approximately two minutes. There was no reported history of a fall, road traffic collision, or other external trauma. On regaining consciousness, he developed acute lower back pain with bilateral leg pain.

Neurological examination demonstrated mildly increased tone in the right lower limb, with normal tone in the left lower limb. Motor power was 5/5 in both lower limbs, except for 4/5 power in left ankle dorsiflexion

and extensor hallucis longus function. Bilateral knee reflexes were mildly brisk, and plantar responses were down-going. Sensation to light touch was reduced from T10 to S3, with absent sensation in the S1-S3 dermatomes. Catheter tug sensation and anal tone were absent. No neurological deficits were identified in the upper limbs. These findings were consistent with a Gibbons type 4 injury [8].

Computed tomography (CT) of the spine and pelvis demonstrated a displaced U-shaped sacral fracture with a transverse component through the upper sacrum and associated spinopelvic dissociation. Anterior translation was present, and the injury was described as Roy-Camille type II [9] and AO (Arbeitsgemeinschaft für Osteosynthesefragen) type C3 morphology (Figure *1*).



FIGURE 1: CT of the pelvis showing displaced U-type sacral fracture, in keeping with spinopelvic dissociation (AO type C3).

AO: Arbeitsgemeinschaft für Osteosynthesefragen.

Magnetic resonance imaging (MRI) demonstrated an S2 fracture with bilateral anterior buckling and kyphotic angulation of the proximal sacrum at the S2 level. There was associated central canal stenosis with compression of the transiting sacral nerve roots (Figure *2*). The absent anal tone, loss of catheter tug sensation, and sacral sensory deficits were consistent with dysfunction of the sacral nerve roots, in keeping with the decompression demonstrated on MRI.

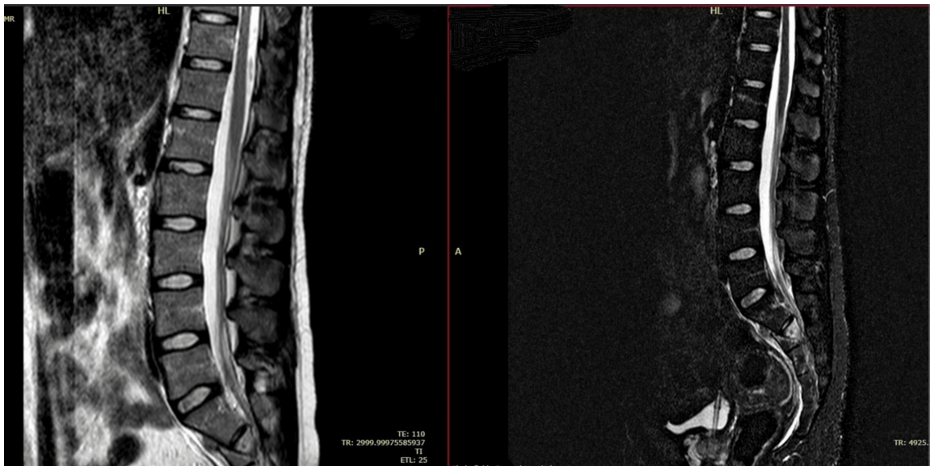


FIGURE 2: MRI of the spine showing a sacral fracture with extension across the S2 level and associated kyphotic angulation, with resultant spinal canal stenosis and impingement upon the transiting sacral nerve roots.

Blood investigations, including serum calcium, thyroid-stimulating hormone, and parathyroid hormone levels, were within normal limits. See Table *1* for summarised results.

Investigation	Result	Reference range
Haemoglobin (g/L)	145	130–180
White cell count (×10⁹/L)	7.4	4.0–11.0
Platelet count (×10⁹/L)	279	150–400
C-reactive protein (mg/L)	4	<5
Sodium (mmol/L)	139	133–146
Potassium (mmol/L)	4.2	3.5–5.3
Urea (mmol/L)	5.0	2.5–7.8
Creatinine (µmol/L)	77	60–120
Corrected calcium (mmol/L)	2.34	2.20–2.60
Thyroid-stimulating hormone (mIU/L)	2.2	0.27–4.20
Parathyroid hormone (pmol/L)	4.2	1.6–6.9

TABLE 1: Relevant laboratory investigations are summarised with normal ranges.

The patient underwent L5 to S2AI instrumented fusion with iliosacral screw fixation to stabilise the spinopelvic injury. Distraction was applied between the L5 and S2AI screws to achieve fracture reduction (Figure *3*). Immediately postoperatively, his bilateral leg pain improved significantly. Over the next seven days, sensory loss from T10 to S3 improved, and catheter tug sensation returned. However, perianal sensation remained absent during this period.

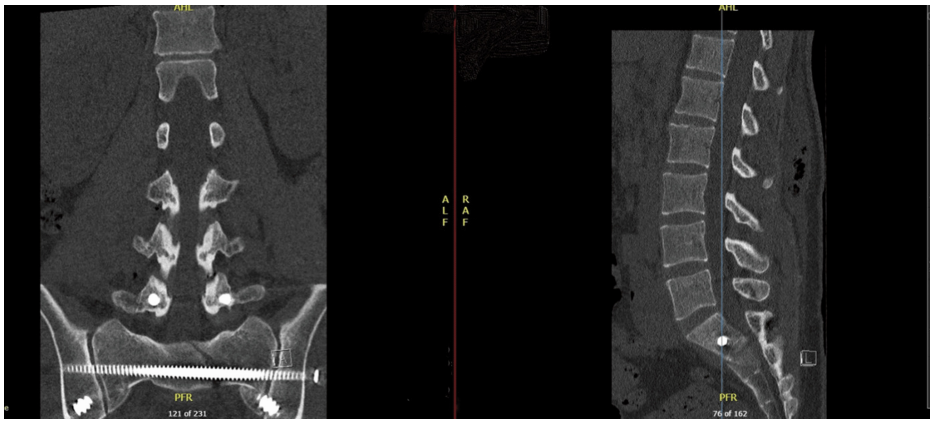


FIGURE 3: Postoperative CT of the pelvis showing L5-S2AI screws with iliosacral screw and fracture reduction.

He progressed with rehabilitation and was independently mobilising by postoperative day 20. He was subsequently discharged with a bowel regimen. He did not attend outpatient follow-up. The available documentation did not establish the patient's anal tone or independent bladder and bowel function at discharge. A review of his general practitioner (GP) records showed that his levetiracetam dose was subsequently increased to 1,250 mg twice daily following discharge.

Discussion

Seizure-related musculoskeletal injuries are well recognised, with fractures occurring either secondary to falls or, less commonly, as a result of intense muscle contractions during tonic-clonic activity. Severe spinal injuries have previously been reported in association with seizures, although some cases have involved significant trauma [3]. In contrast, our patient sustained an unstable spinopelvic dissociation following a witnessed tonic-clonic seizure while seated, without any reported fall or external trauma [4].

Spinopelvic dissociation is an uncommon but severe injury pattern, typically associated with high-energy

trauma [5]. It is characterised by bilateral vertical sacral fractures with a transverse component, creating a U-shaped configuration and resulting in dissociation between the axial spine and the pelvic ring [10]. These injuries are frequently associated with significant neurological compromise due to sacral canal involvement. In this patient, imaging findings correlated closely with clinical deficits, including sensory loss, absent anal tone, and loss of catheter tug sensation.

The mechanism of injury in this case is unusual. In the absence of significant external trauma, plausible explanations include para-spinal or gluteal muscle spasm generating high lumbo-pelvic forces, though an unwitnessed minor impact cannot be fully excluded [3]. Some antiepileptic medications are associated with reduced bone mineral density, but this patient was taking levetiracetam, which is not commonly associated with the same degree of adverse skeletal effects as enzyme-inducing agents [1,11]. Although the patient's biochemical investigations were within normal limits and there were no obvious radiological features of osteopenia, no previous dual-energy X-ray absorptiometry (DEXA) scan was documented. Therefore, reduced bone mineral density could not be excluded. Such an assessment may have provided useful information about possible underlying skeletal fragility, particularly given the unusual nature of the fracture.

This case highlights the importance of careful clinical assessment following a seizure. Back pain in the post-ictal period is often attributed to benign causes such as muscular strain; however, persistent or severe pain, particularly when accompanied by radicular symptoms or sphincter disturbance, should prompt further investigation. MRI is the modality that most reliably separates mechanical from serious spinal pathology when symptoms persist, or neurological signs emerge [12,13]. In this case, early cross-sectional imaging was essential in identifying an unstable fracture pattern with neurological compromise and enabled timely surgical intervention.

Surgical fixation was appropriate given the instability of the injury and the presence of neurological deficits. The patient underwent L5 to S2AI instrumented fixation with iliosacral screw placement. Distraction between L5 and S2AI screws was used to achieve fracture reduction and stabilisation. His postoperative improvement in pain and partial neurological recovery suggests early clinical benefit.

One limitation of this case is the lack of long-term follow-up, as the patient did not attend further outpatient appointments. Although some improvement was seen after surgery, we were unable to assess his longer-term neurological recovery or fracture healing. As a result, potential complications such as nonunion, implant failure, or loss of fracture reduction could not be assessed.

This case demonstrates that spinopelvic dissociation can occur following a tonic-clonic seizure even in the absence of external trauma. Clinicians should not dismiss acute back pain or neurological symptoms after a seizure as benign post-ictal sequelae. The presence of severe pain, radicular symptoms, or sphincter disturbance should prompt early imaging to exclude significant spinal injury.

Conclusions

Spinopelvic dissociation is a rare but severe injury that may occur following tonic-clonic seizures even in the absence of external trauma. This case highlights the importance of recognising significant spinal pathology in post-ictal patients presenting with back pain and neurological deficits. Early imaging and timely surgical management are essential to optimise outcomes.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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